

SUMMARY OF INVESTIGATION FOR DAMAGES EXPERT

BY SEEON BIRGER

**SUBMITTED ON BEHALF OF PLAINTIFF
ORACLE AMERICA, INC.**

5. I discuss the steps I took to create software builds that represent images of the Android VM that selectively disable the patents at issue below. It is my understanding that performance benchmarking was conducted on these images.

Education and Work Experience

6. I graduated from Technion - Israel Institute of Technology as a computer engineer, and worked as a computer engineer since 1995.

7. I have over 15 years of experience in software engineering and performance optimization. During my career, I have conducted numerous performance measurements, identified performance bottlenecks, and invented techniques to improve performance.

8. During my work at Sun Microsystems which was acquired by Oracle, I worked on porting various components of the Java virtual machine to new platforms, and conducted some comparisons between JVM and Android's Dalvik VM.

9. I am qualified to conduct performance benchmark and testing analysis and analyze the results obtained because I have done performance measurements numerous times before for internal measurements and for customer specific projects.

10. I am qualified to write and execute the software builds discussed below.

The Software Builds

11. At the request of Professor Cockburn, I created several software builds that represent Android operating system with features selectively disabled that correspond to those found in the patents at issue, as detailed below. Although some are labeled "Rebuild" and others "Image", all are the working images that I have created that implement the software build that selectively disables the patents at issue.

12. "Rebuild 0" is not a rebuild but an unmodified Android operating system.

13. "Image 2" is a software build that disables the '205 patent based on both theories of infringement.

14. "Rebuild 3" is a software build that disables the '720 patent

15. “Image 5” is a software build that disables the ’520 patent
16. “Rebuild 6” is a software build that disables the ’104 and ’205 patents.
17. “Image 7” is a software build that disables the ’104, ’205 and ’720 patents.
18. “Image 13” is a software build that disables the ’205 and ’720 patents.
19. For each software build, I went through the following procedures to ensure that the functionality associated with the particular patent or patents stated above were disabled:

The baseline for all software builds was the Froyo release of Android, pulled from the Google git repository with the Google repo commands:

```
$ repo init -u git://android.kernel.org/platform/manifest.git -b froyo
$ repo sync
```

to initialize and sync from the Google repository. For each software build I applied the merged code changes that are relevant to the patents disabled (See below) and ran a clean build:

```
$ source build/envsetup.sh
$ lunch full_passion-userdebug
$ make clean
$ make
```

Code changes for disabling each patent:

‘720 –
Files changed in ‘frameworks/base’ git:
 core/java/com/android/internal/os/RuntimeInit.java
 core/jni/AndroidRuntime.cpp
See attached git diff file: frameworks-base-720.diff

‘104 –
Files changed in ‘dalvik’ git:
 vm/Dalvik.h
 vm/analysis/DexOptimize.c
 vm/oo/Resolve.c
See attached git diff file: dalvik-104.diff

‘205–
Files changed in ‘dalvik’ git:
 vm/Init.c
 vm/InlineNative.c

See attached git diff file: dalvik-205.diff

‘205-jit –

Files changed in ‘dalvik’ git:
vm/Init.c

See attached git diff file: dalvik-205-jit.diff

‘205-inline –

Files changed in ‘dalvik’ git:
vm/InlineNative.c

See attached git diff file: dalvik-205-inline.diff

‘520 –

Files changed in ‘dalvik’ git:
dx/src/com/android/dx/cf/code/ByteArray.java

See attached git diff file: dalvik-520.diff

‘702 –

Files changed in ‘dalvik’ git:
dx/src/com/android/dx/dex/file/DexFile.java
dx/src/com/android/dx/dex/file/FieldIdsSection.java
dx/src/com/android/dx/dex/file/MethodIdsSection.java
dx/src/com/android/dx/dex/file/ProtoIdsSection.java
dx/src/com/android/dx/dex/file/StringIdItem.java
dx/src/com/android/dx/dex/file/StringIdsSection.java
dx/src/com/android/dx/dex/file/TypeIdsSection.java
dx/src/com/android/dx/dex/file/UniformItemSection.java

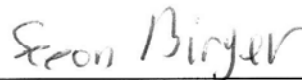
See attached git diff file: dalvik-702.diff

20. The differences from the original Android OS source file related to each image are captured in the attached git diff files in Appendix A.

21. The images were uploaded onto an FTP site for use by Oracle’s experts in this case.

I declare under penalty of perjury that the foregoing is true and correct.

Dated: September 12, 2011



Seon Birger